

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference PCTP173004A	FOR FURTHER ACTION		See Form PCT/PEA418
International application No. PCT/NL2004/000531	International filing date (day/month/year) 23.07.2004	Priority date (day/month/year) 28.07.2003	
International Patent Classification (IPC) or national classification and IPC B29D30/30, B29D30/58, B65H23/02, B65H20/06			
Applicant VMI EPE HOLLAND B.V. et al.			
1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36. 2. This REPORT consists of a total of 6 sheets, including this cover sheet. 3. This report is also accompanied by ANNEXES, comprising: a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau a total of 6 sheets, as follows: <input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions). <input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box. b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).			
4. This report contains indications relating to the following items: <input checked="" type="checkbox"/> Box No. I Basis of the opinion <input type="checkbox"/> Box No. II Priority <input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability <input type="checkbox"/> Box No. IV Lack of unity of invention <input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement <input type="checkbox"/> Box No. VI Certain documents cited <input type="checkbox"/> Box No. VII Certain defects in the international application <input checked="" type="checkbox"/> Box No. VIII Certain observations on the international application			
Date of submission of the demand 20.06.2005	Date of completion of this report 12.10.2005		
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Fregosi, A Telephone No. +49 89 2399-7104		



**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/NL2004/000531

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

1-15, 17-20 as originally filed
16 received on 05.07.2005 with letter of 04.07.2005

Claims, Numbers

1-25 received on 05.07.2005 with letter of 04.07.2005

Drawings, Sheets

1/10-10/10 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
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Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-25
	No: Claims	
Inventive step (IS)	Yes: Claims	1-25
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-25
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item V

**Reasoned statement with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement**

1. The following documents are referred to in this communication:

D1: JP 8058958 - A (figures 5 and 1, and the WPI/Derwent abstract);

D2: EP 844067 - A.

2. With reference to the independent claims **1** and **22**, the assumptions laid down at paragraph **Re Item VIII** should be considered because they have been used for the interpretation of the claims.

3. **Independent claims 1 and 22**

3.1 The features recited in claim **1** are not disclosed, in combination, in any of the available prior art documents.

This claim is therefore new according to Art. 33 (2) PCT.

3.2 The closest prior art appears to be document **D2**, which shows a strip conveying apparatus comprising two conveyor belts placed one after the other; the gap between the two conveyors is used for the operation of the strip detecting device, which includes a light source and an image recorder.

3.3 The technical contribution of claim **1** over the prior art is to solve the problem of providing a more uniform support to the strip being conveyed (since strips made of unvulcanized rubber and used in tyre manufacturing are plastic and easily deformable).

3.4 This is achieved by incorporating in the known conveying apparatuses a continuous main conveyor belt which is able to support the whole strip in its central portion and to prevent undesired deformations and measuring errors, while the lateral portions of

the strip are detected by the known strip detecting devices.

3.5 Although this combination of main and auxiliary conveyor belts is known, per se, from **D1**, nevertheless, no suggestion is given in **D1** to introduce these features in the apparatus of **D2** to solve the above mentioned problem.

Claim 1 meets therefore the requirements of Art. 33 (3) PCT with respect to inventive step.

3.6 Similarly, independent claim 22, which discloses a method for applying a tread on a building drum using the device according to any of the claims 12-21 (depending on claim 1), is considered to comply with Art. 33 PCT.

4. Dependent claims

4.1 Dependent claims 2-21 and 23-25 as such also meet the requirements of the PCT with respect to novelty and inventive step.

Re Item VIII

Certain observations on the international application

5. In claim 1 the functional feature of the claimed recorder is not disclosed. It is evident from the content of the application that the function of said recorder is: "to measure the position of the strip-shaped material". Therefore, claim 1 has been interpreted accordingly.

6. Similarly, from the method claim 22 it is not clear how the step of measuring the position of each segment of the tread on the tread conveying device is carried out. It is evident from the content of the application that this measuring step is carried out by "the recorder disclosed in claim 1". Under this assumption the consistency between the apparatus claims 12-21 (depending on claim 1) and the method claim 22 is clear. Therefore, claim 22 has been interpreted accordingly.

**INTERNATIONAL PRELIMINARY
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(SEPARATE SHEET)**

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conveyor belts, wherein the conveyor belts comprise a main conveyor belt 41 which supports the middle of the tread. Said main conveyor belt runs from the feed side through to the discharge side. The tread conveying device furthermore comprises a first feed auxiliary conveyor belt 43 and a second
5 feed auxiliary conveyor belt 45 on both sides of the main conveyor belt 41, at the feed side. The main conveyor belt and both feed auxiliary conveyor belts on both sides share a common driving roller 25 and driving means 16. Moreover the feed auxiliary conveyor belts 43 and 45 and the discharge auxiliary conveyor belts 42 and 44 are connected to each other by means of
10 toothed belt 47. As a result the speeds of the main conveyor belt and the feed auxiliary conveyor belts and the discharge auxiliary conveyor belts are almost equal.

In addition the tread conveying device 15 comprises a discharge auxiliary conveyor belt 42 and discharge auxiliary conveyor belt ~~43~~⁴⁴ both on both sides
15 of the main conveyor belt 41, at the discharge side. The main conveyor belt 41 and both discharge auxiliary conveyor belts share a bearing roller 27 so
~~that the speeds of the main conveyor belt and the discharge auxiliary~~
conveyor belts are equal.

20 Both discharge auxiliary conveyor belts 42, 44 are positioned at a short distance from both feed auxiliary conveyor belts 43 and 45 so that a measuring slit 46 is created on both sides of the main conveyor belt 41. Underneath the slit 46 a lamp (number 31 in figure 3) has been mounted and
25 above the slit 46 a camera 17 has been mounted for making recordings of segments of the tread 1 while the tread is conveyed over the slit 46.

From the images the exact position of each segment of the tread can be determined. In an embodiment both sides of the tread are determined,
30 because the sides yield a high contrast because of the (relatively underexposed) black tread with respect to the slit lighted from below. From the position of both sides the position of the middle of the tread can be

EPO - DG 1

05. 07. 2005

Claims (amended)

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1. Device for conveying strip-shaped material, such as a tread, from a feed side to a discharge side, comprising a main conveyor belt extending from the feed side to the discharge side, and auxiliary conveyor belts on both sides of the main conveyor belt and which each comprise a feed conveyor belt and a discharge conveyor belt, a slit-shaped opening between the feed conveyor belt and the discharge conveyor belt, positioned for on both sides of the main conveyor belt forming a slit, and a recorder, preferably an image recorder, such as a camera or line scan camera, above or below the slit.
2. Device according to claim 1, wherein opposite the recorder at the other side of the slit a lighting unit is disposed, such as a fluorescent lighting or a stroboscopic lighting.
3. Device according to claim 1 or 2, further provided with a control unit, operationally connected to the recorder, memory means for storing an image of a complete strip of strip-shaped material, and calculation means for calculating the strip position on the device based on the recordings of the image recorder.
4. Device according to any one of the preceding claims, wherein the slit-shaped openings of the auxiliary conveyor belts extend in line.
5. Device according to any one of the preceding claims, wherein the main conveyor belt is adapted for over its full length supporting a strip.
6. Device according to any one of the preceding claims, wherein the main conveyor belt comprises retaining means for retaining the strip-shaped

material on the main conveyor belt, and preferably the retaining means retain the strip on the main conveyor belt over almost its full surface supported on the main conveyor belt.

- 5 7. Device according to any one of the preceding claims, wherein the main conveyor belt is smooth for retaining an unvulcanised rubber strip on the main conveyor belt almost fixed in place, wherein preferably the auxiliary conveyor belts are smooth for retaining an unvulcanised rubber strip on the auxiliary conveyor belts almost fixed in place

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8. Device according to any one of the preceding claims, wherein the feed conveyor belts are shorter than the discharge conveyor belts, preferably shorter to such an extent that the slit is near the feed side.

- 15 9. Device according to any one of the preceding claims, wherein the conveyor belts are so-called timing belts, provided with a servo-drive.

- 20 ~~10. Device according to any one of the preceding claims, provided with driving means at the feed side for the common driving of the main conveyor belt and feed conveyor belts, preferably a common driving roller or guiding roller.~~

- 25 11. Device according to any one of the preceding claims, provided with driving means at the discharge side for the common driving of the main conveyor belt and feed conveyor belts, preferably a common driving roller or guiding roller.

- 30 12. Tread application device for applying a tread on a building drum for a tyre, comprising:
- a tread conveying device according to any one of the preceding claims for conveying a tread to a building drum, from a feed side of the tread conveying device to a discharge side of the tread conveying device in a

conveyance direction, and

- a positioning device for positioning the tread on the building drum, wherein the positioning device comprises measuring means at the feed side for determining the position of a segment of the tread and generating a position value, displacement means for displacing the segment of the tread with a displacement directional component parallel to the axis of rotation of the building drum, and control means, connected to the measuring means and the displacement means, for on the basis of the position value controlling the displacement device during the application of the segment of the tread on the building drum.

13. Device according to claim 12, wherein the main conveyor belt comprises a feed bearing roller and a discharge bearing roller, wherein the feed bearing roller forms a bearing roller for the feed auxiliary conveyor belts and the discharge bearing roller a bearing roller for the discharge auxiliary conveyor belts.

14. Device according to claim 12 or 13, wherein the tread conveying device is positioned mobile for displacing the discharge side with a directional component parallel to the axis of rotation of the building drum.

15. Device according to claim 14, wherein the tread conveying device is rotatably positioned about an axis of rotation substantially perpendicular to the displacement direction, preferably substantially perpendicular to the plane of the tread.

16. Device according to claim 14, wherein the tread conveying device is positioned with the axis of rotation near the feed side for rotating the tread conveying device substantially parallel to a tread to be applied, preferably with the axis of rotation substantially in the middle below a tread to be applied.

17. Device according to claim 12, wherein the measuring means comprise a calculation unit for calculating a middle position value of the segment from a recorded image of a segment.

5 18. Device according to any one of the preceding claims 12-17, comprising means for securing a segment of a tread, preferably a tread over its full surface, on the tread conveying device.

10 19. Device according to any one of the preceding claims 12-18, further comprising further measuring means for determining the length of a tread.

20. Device according to claim 19, further comprising means for adapting the length of a tread based on the result of the difference between the length measured and a predetermined set length.

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21. Device according to claim 20, wherein the measuring means comprise at least an image recorder for recording an image of at least a segment of the tread, the control means comprise a computer, the tread conveying device comprises driving means for driving the tread conveying device at an adjustable speed of movement of the tread, and the building drum comprises building drum driving means for driving the building drum at an adjustable speed of circulation, wherein the image recorder, the driving means and the building drum driving means are connected to the computer for exchanging data with the computer, and the computer comprises software for based on
20 images of the image recorder calculating the position and the length of a tread, and based on the calculated length adjusting the mutual operation of the driving means and building drum driving means.
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30 22. Method for applying a tread on a building drum for a tyre using the device according to any one of the claims 12-21, wherein the position of each segment of the tread on a tread conveying device is measured, after which the tread conveying device conveys the tread to the building drum and

applies it on the building drum, wherein during application of the tread on the building drum the position of a segment of the tread that is applied on the building drum is repeatedly adjusted to a pre-set value prior to it being applied on the building drum by laterally displacing the tread conveying device with respect to the building drum.

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23. Method according to claim 22, wherein over nearly the full length of the tread the middle is repeatedly determined from a measurement of the position of both sides of a segment.

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24. Method according to claim 22 or 23, wherein during the application the tread on the building drum a part of the section of the tread that has not yet been applied on the building drum is displaced with respect to the building drum with a displacement component parallel to the axis of rotation of the building drum.

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25. Method according to claim 24, wherein during displacing the part of the tread that has not yet been applied on the building drum, a leading part of the tread is applied on the building drum, and a trailing part of the tread is retained on a tread conveying device.

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